The unemployment rate receives at least as much attention as any other macroeconomic variable, if not more. The Bureau of Labor Statistics reports the rate each month, and the media, national and local, give it broad coverage. An unemployed person faces many problems that are not at all hard to imagine. Bills continue coming in each month, prospects for employment may be uncertain, and for many health insurance may have been lost with the job. It can depress the hardy, and frighten the brave. The unemployment rate puts a human face on the state of the macroeconomy.

In this chapter we analyze the meaning of the unemployment rate. How is it calculated? Is some unemployment normal? What is the relationship between the unemployment rate, and real GDP? These are some of the questions that occupy us here.

We begin by describing the BLS survey, and flows in the labor market. We then define the unemployment rate, the employment rate, the participation rate, and the relationship between the three. No measure is perfect, and we discuss some of the frailties of the employment and unemployment numbers. Often times economists categorize unemployment by type, and, though this is sometimes ambiguous, the types are useful to know. Finally, we connect the unemployment rate to real GDP through Okun's Law.

The BLS Survey: Definitions

For the purpose of calculating the number of employed and unemployed people the BLS surveys the adult non-institutionalized population. Living 16 years qualifies you for adulthood in this context. The survey, conducted each month, includes about 60,000 respondents who represent the demographic characteristics of the U.S. economy. The typical public opinion poll
the media report samples only 500 to 3,000 people. The size of the BLS survey makes it an
accurate snapshot of the state of the labor market.

The survey asks a series of questions about the status of the respondent in the reference
week, the calendar week which includes the 12th of the month. First, it asks if the respondent
has been employed in the reference week. Respondents who were paid full- or part-time
workers, or worked in their own or family business count as employed, and those who were
temporarily absent from work because of vacation, illness, or labor dispute are also included in
the employed. If the respondent does not fall into one of the above groups, a second set of
questions is posed: Did you look for work in the reference week? Were you waiting to be
recalled from a layoff? Were you waiting to start a job within the next 30 days? A yes to any of
these questions classifies the respondent as unemployed. The total number of employed and
unemployed people makes up the work force. If all of the questions are answered with a no, the
respondent is classified as out of the work force.

The three possible classifications, employed, unemployed, and out of the work force, are
mutually exclusive and exhaustive. We can summarize the categories as:

\[
\text{Pop} = \text{Employed} + \text{Unemployed} + \text{Out of the Work Force},
\]

where Pop is the adult non-institutionalized population. For 1992 the numbers were

\[
193,142 = 119,164 + 9,384 + 64,594,
\]

where the above numbers are in thousands of persons so that, for example, there were 9,384,000
people unemployed. The work or labor force in 1992 was

\[
128,548 = 119,164 + 9,384
\]

These numbers include the members of the armed forces in the non-institutionalized
population, and count them as employed. Often times these people are excluded, and civilian
employment is reported. Presumably, this reflects the days when the military draft introduced
ambiguity into the "non-institutionalized" status of a soldier.
Labor Market Flows

People flow into the work force as they finish school, or return to work after a stint at home. People flow out of the work force when they retire from their jobs, or quit to return to school or home. New hires or recalls from layoffs shrink the numbers of the unemployed, but quits, fires, and new layoffs replenish their number. The numbers of unemployed also shrink when people give up the search, and leave the work force. These people are often called discouraged workers. In short, the labor market is in a constant state of change. The flows are summarized in Table 4.1.

Of the unemployed in 1992 about 56% were there because they lost their jobs. Of this amount about 24% were on layoff. The remainder may have lost their jobs because their employers went out of business, cut their jobs, or perhaps they were fired. Roughly 10% of the unemployed were job leavers who presumably quit to search for more lucrative, or rewarding work. The remaining 33% of the unemployed were new or reentrants experiencing a spell of unemployment as they searched for new jobs.
The Rates

The BLS uses the results from the survey to calculate various rates, the unemployment rate being the best known. The unemployment rate, call it ur for short, is the fraction of the work force who are unemployed. In symbols it is

\[
ur = \frac{U}{U + E},
\]

where \(U\) is the number of unemployed, \(E\) is the number of the employed, and the sum \(U + E\) is the work force. The employment rate, call it er, is the fraction of the non-institutionalized population that is employed. It is given by

\[
er = \frac{E}{POP}.
\]

Another rate, which connects the above two, is the participation rate, pr. It is the fraction of the non-institutionalized population in the work force, or, in symbols,

\[
pr = \frac{U + E}{POP}.
\]

In 1992 these rates were:

\[
ur = \frac{9,384}{119,164 + 9,384} = .073 \quad \text{or} \quad 7.3%
\]
\[
er = \frac{119,164}{193,142} = .617 \quad \text{or} \quad 61.7%
\]
\[
pr = \frac{119,164 + 9,384}{193,142} = .666 \quad \text{or} \quad 66.6%
\]

The rates are plotted in Figures 4.1 and 4.2.

At first glance it seems as if the employment rate should rise when the unemployment rate falls, but this is not necessarily true. To connect the three rates first observe that

\[
1 - ur = \frac{U + E}{U + E} - \frac{U}{U + E} = \frac{E}{U + E}.
\]
This means that

$$(1 - ur).pr = \left[ \frac{E}{(U + E)} \right] \cdot \left[ \frac{(U + E)}{POP} \right] = \frac{E}{POP} = er$$

This little bit of algebra tells us that the employment rate will rise when the unemployment rate falls so long as the participation rate doesn't change. However, the participation rate often changes. Indeed, over the past 20 years all three of these rates have increased. The participation rate rose from about 60% to its current level around 66%. Over the same period the employment rate rose from 57% to about 62%, and the unemployment rate climbed from 5.5% to a bit over...
7%. The concurrent increase in the employment and unemployment rates was made possible because over the same period the participation rate rose also.

The BLS also reports unemployment rates for subgroups of the population. For example, in 1991 the overall unemployment rate was 6.7%, while the rate for males was 7%, the rate for females was 6.3%, and the rate for African-Americans was 12.4%. Teen unemployment is much higher. The unemployment rate for all teens reached 18.6% in 1991, while teen unemployment among African-Americans was nearly double this figure at 36.3%.

**Types of Unemployment**

Unemployment may arise for many reasons, and it is useful to know them. A policy that addresses one person's problem may not address another's. For example, the seasons of the year cause some unemployment. In the winter, construction work may be hard to come by because of inclement weather, and summer finds a flood of students in the work force, swelling the numbers of the unemployed. This type of unemployment is called seasonal unemployment. Beyond calls for summer jobs programs, most discussions of unemployment do not address the issue of seasonal unemployment. Most reported estimates, such as those plotted in Figures 4.1 and 4.2, adjust for these seasonal variations by subtracting out that part of unemployment due to changes in the time of year.

Other unemployment reflects the normal flux in the labor market. When a new graduate or returning house spouse enters the work force it may take some time to find a good job match. Indeed, it would probably be unwise to snap up the first job offer. Similarly, when a firm posts a vacancy, it is wise to allow some time to pass to enrich the pool of applicants. This improves the chances of a good hire. This type of unemployment arises because of the costs of making a good job match between a worker and a firm, and is called frictional unemployment. There will always be some frictional unemployment in an economy as some workers leave the work force, and vacancies open, while others enter to find jobs. Moreover, some frictional unemployment improves the overall efficiency of the economy since it results in better job matches.

Another enduring feature of the labor market is change. Employment in whaling declines, while jobs in the oil fields replace them. The blacksmiths disappear, while the auto mechanics flourish. The typist gives way to the wordprocessor. These changes in the relative structure of
the labor market often induce unemployment. To take another example, output from large steel mills declined in the past two decades as steel made abroad and at small specialty steel mills in the U.S. replaced it. Employment in the large mills fell as the mills closed or cut back production. At the same time employment opportunities in computer programming grew as the spread of computers generated a demand for user-friendly software adapted to specialized needs. There would be no problem if the steel workers could step in to fill the need for more programmers, but, of course, this is not the case. Not only do the skills of the steel worker differ from those of the programmer, but the new jobs are in a different part of the country.

Unemployment that arises from a change in structure of the labor market is called structural unemployment. Unemployment from this cause may last a long time as the skills for one job may be very different than the skills needed for another. Moreover, the next best job available to our laid off steel worker may be a job flipping burgers at a fast food joint at the minimum wage, a wage one-fourth the size of the wage of a steel worker.

Finally, some unemployment is associated with the business cycle. In a recession output declines, employment falls, and unemployment rises. We document the close association between output and unemployment in the next section when we discuss Okun's Law. Unemployment that reflects fluctuations in aggregate economic activity is called cyclical unemployment.

These categories of unemployment are not mutually exclusive. In particular, a change in the structure of the economy may cause or contribute to a recession. The recent, sharp reductions in military spending, and the increase in base closings seriously disrupted local economies; and these shocks to local communities may have contributed to the recession that began in July of 1990. A structural shock, and the structural unemployment it brings, may induce a recession and cyclical unemployment. In a case like this one, it would be difficult, if not impossible, to distinguish between structural and cyclical unemployment.

As we mentioned earlier, different types of unemployment respond to different policies. A national jobs bank or clearing house might reduce frictional unemployment by making it easier to match worker and job. The structurally unemployed may profit from subsidized retraining, and aid in relocating. Changes in government spending, taxation, or the supply of money - topics which we will discuss in detail later - may be appropriate treatments for cyclical unemployment.
Shortcomings in the Measures

No measure is perfect, and the rates we just defined are not exceptions. The official rates do not reveal several subtleties. First, both part-time and full-time workers are counted as employed. Some part-time workers, however, may be seeking full-time employment, perhaps barely able to get by on a part-time salary. In a very real sense they are currently partially unemployed. Second, discouraged workers are not counted as unemployed because they have given up the search. They abandoned the search not because they no longer care to work, but because they assign such a low probability to finding work that the search is just not worthwhile. These two shortcomings lead to an underestimate of unemployment, or at least the hardship that the unemployment rate seeks to reflect.

The survey does not ask the unemployed how hard they searched, or if they expect a realistic wage given their talent and training. Is someone with a high school education who is holding out for a job as a brain surgeon really searching for work? If many of the unemployed are holding out for high-paying jobs near their homes while their spouses bring in a large incomes, the unemployment numbers will paint too dismal a picture.

The official figures may miss those employed in the underground economy. People who work in the underground economy often do so to avoid paying taxes, and may be skittish about reporting their employment to a federal agency. Also, some government benefits require the person to be unemployed, and people who receive these benefits but work in the underground economy may be reluctant to report their status.

There are also other dimensions of unemployment. Many economists have noted that if there are 52 weeks of unemployment, it is better that 52 people are unemployed for a week each than to have one person unemployed for all 52. Most families could deal without too much difficulty with the loss of one week’s pay. They can dip into savings, put off a needed repair, or postpone paying a bill or two. Unemployment that lasts a year will entirely drain the savings of many families, and put their property in jeopardy to the bill collectors. In addition to these material losses, a year without work can put stress on relationships within the family, destroying marriages and damaging children.

In short, the duration of unemployment is a very important dimension of the problem. Fortunately, it turns out that most of the unemployed spend a fairly short time without work. In
1992 half of the unemployed found work within 9 weeks, and more than one third within 5 weeks. Nevertheless, more than 20% of the unemployed spent at least 27 weeks as jobless. There is little doubt that the nearly 2 million people this represents suffered real hardship.

A related aspect of unemployment is its distribution. Let's consider an "average" household who wants to work, say, 40 hours a week. In 1990 the unemployment rate was 5.4% so we can think of our average household as getting only about 37 hours and 50 minutes of work; that is, 94.6% of the amount they desired. The recession that began in mid-1990 raised the unemployment rate to 6.6%, and our average worker could get just 93.4% of the hours she desired. This would have dropped the hours to about 37 and 21 minutes. The increase in the unemployment rate costs our average household about 30 minutes of work a week. If unemployment were equally distributed so everyone suffered the same loss of work as the average household, its burden would be greatly reduced. In practice this does not happen. Everyone doesn't lose 30 minutes of work. Instead, most people do not lose any hours, but a few lose it all. The burden of unemployment falls on a relatively small number of people.

When member of a large group of people each have a small independent chance of a large loss, there is a role for insurance. Insurance spreads the cost of the bad outcome across the large pool of people. Unemployment insurance serves this function, and provides some support for the unemployed. In the U.S. about 95% of civilian workers are covered by unemployment insurance. The benefits of unemployment typically last 6 to 9 months, and replace about half of the lost income. This program surely reduces the burden on the unemployed. Unfortunately, it also provides an incentive to remain unemployed for a longer time. Some economists believe that more generous unemployment insurance benefits raise the unemployment rate. The news may not be all bad. Longer spells of unemployment, if used to search for a job, may result in better job matches, and a more efficient allocation of labor.

To summarize, the unemployment rate is an imperfect and incomplete measure of the burden of joblessness. Some aspects of the BLS survey tend to underestimate the burden, while other aspects may overstate it. The burden of unemployment falls on those who lose their jobs, it is not equally shared. Moreover, some of the unemployed suffer for an extended period.

**Okun's Law**

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The calculation is \((.946)^{40} = 37.84\), which is about 37 hours and 50 minutes.
Cyclical unemployment results from turns in the business cycle. Nearly 30 years ago the economist Arthur Okun documented the empirical relationship between the unemployment rate and real GDP that has come to be known as Okun's Law. Figure 4.3 shows a scatter diagram of the annualized change in unemployment (Δur) and the annualized percentage change in real GDP (%ΔY). Each point in the diagram represents one observation of Δur and %ΔY. For example, from the second to the third quarter of 1950 Δur was about -3.8 while %ΔY was over 14%. This point is labeled 50.3 in Figure 4.3. The second quarter combination of real growth and the change in unemployment for 1980 is also shown in the figure.

The scatter diagram reveals a strong and consistent negative relationship between Δur and %ΔY. The line that "best fits" this scatter of points in the Figure 4.3 is drawn in the diagram, and is given algebraically by

\[ %\Delta Y = 3 - 2\Delta ur \]

This quantifies the relationship between the unemployment rate and real output. It allows us to forecast real GDP growth from the current unemployment rate. The unemployment rate is reported monthly, but real GDP comes out only every three months. For example, real GDP growth for the second quarter of a year, April through June, is reported in late July. Well before then the April and May unemployment numbers are out. Suppose in March unemployment stood at 7%, but by May had fallen to 6.6%. This .4 percentage point decline over two months translates into an annual decline of 2.4 (= 6(.4)) percentage points. Using Okun's law we would predict that annualized real GDP growth over this two-month period would be around

\[ %\Delta Y = 3 - 2(-2.4) = 3 + 4.8 = 7.8\% \]

This would be vigorous economic growth indeed, and goes to show that the economy must grow very rapidly for the unemployment rate to drop quickly.

**Summary**
Unemployment puts a human face on aggregate economic activity, and the BLS takes great pain to provide an accurate and meaningful measure of it. In this chapter we have looked closely at unemployment, employment, and labor market participation. In the chapters that follow we try to understand fluctuations in real output, and you should always keep in mind that the fluctuations in real output that we examine have implications for unemployment through Okun's Law.

![Figure 4.3 Okun's Law](image)

**REVIEW QUESTIONS**

1) Consider the following data for the U.S. in December, 1991 (figures are in thousands of people):

   employed persons 125,619
Calculating the Unemployment Rate

Unemployed persons: 8,891  
Adult population: 190,605

a) Calculate the unemployment rate
b) Calculate the employment rate
c) Calculate the participation rate
d) Suppose 10 million people enter the workforce, but only 5 million find jobs. The other 5 million are unemployed. Recalculate the unemployment and employment rates. Assume that the adult non-institutionalized population is constant.

3) Suppose that the unemployment rate is .07 or 7%, and 150 people are employed. How many people are unemployed?

4) From 1981 to 1982 total output in the U.S. fell by 2.6%. The unemployment rate in 1981 was 7.5%. What does Okun's Law predict for the unemployment rate in 1982? The actual rate in 1982 was 9.5%.

5) Suppose you are told that in some country there are very few discouraged workers, and the unemployment compensation scheme is very generous. In this country will the measured unemployment rate tend to be "too high" or "too low" as a measure of hardship? Explain.

6) Roger has just graduated from college with a degree in accounting. All of the people with whom he has talked and the reports he has read tell him that there are many openings. Nevertheless, Roger has searched for work all summer long, but has yet to land a job. Roger suffers most likely

a) Cyclical unemployment
b) Frictional unemployment
c) Seasonal unemployment
d) Structural unemployment